

## **Lighting Fixture Diffuser with Integral Sensor Lens**

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Lighting fixtures typically include a housing, a light source (e.g., light bulbs, LED's), and a translucent diffuser. The translucent diffuser allows the light generated by the light source to pass through the diffuser to the space being illuminated while providing a pleasing visual appearance.

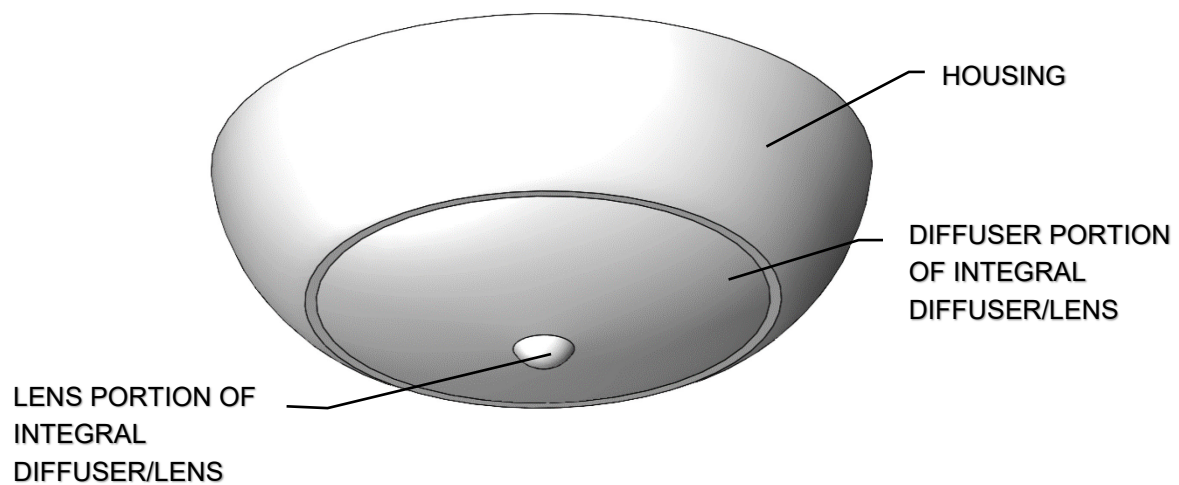
Lighting fixtures may optionally include one or more occupancy/vacancy sensors to control whether the light source is illuminated or not. A passive infrared sensor (PIR's) is an example of such sensor. PIR's are typically used in conjunction with lenses such as Fresnel lenses. Fresnel lenses include multiple facet sections which create a range of detection areas.

A PIR sensor may be added to a typical fixture by drilling a hole in the fixture housing, attaching the PIR sensor to the housing, and wiring the PIR sensor to the fixture. Adding a PIR to a lighting fixture can be time consuming, expensive, and compromise the ingress protection (e.g., the "IP" rating) of the fixture.

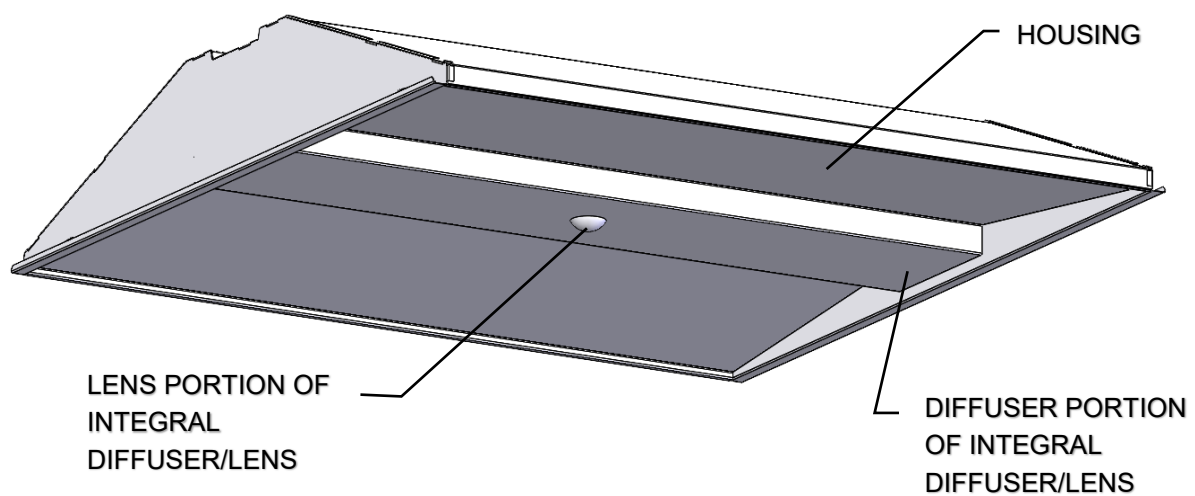
As an alternative, a diffuser of a lighting fixture can include an integral sensor lens such as a Fresnel lens (any suitable lens can be used). In this case, the sensor could be integrated to the fixture, thus saving labor and material costs. In one embodiment, the diffuser and Fresnel lens are molded out of a single piece of polymer (e.g., a plastic such as polycarbonate). By integrating the sensor lens and the diffuser into a single piece of polymer, separate tooling (e.g., molds) for both the sensor lens and diffuser are no longer required. Such an integral diffuser/lens could be used with fixtures both with and without a built-in sensor. If a lighting fixture is to include a sensor, the sensor element itself (and any associated electronic components) would just have to be added (e.g., populated on a printed circuit board). Secondary operations such as drilling a hole in the fixture housing would be eliminated, thus eliminating the potential of compromising the IP rating of the fixture. In addition, by integrating the sensor lens into the diffuser, managing inventory at the place of manufacture could be simplified.

In addition, the sensor element and associated electronic components could optionally be packaged into a "plug and play" module which could be installed in the interior of the fixture at the place of manufacture, by the installer, or by the end-user. In this manner, both the fixture and the sensor elements can be sold separately or together at a point of sale, further simplifying inventory management.

Integral diffusers/lenses can be included on any suitable type of lighting fixture such as but not limited to troffers, pendants, recessed fixtures, track lighting, sconces, lamps, cove lighting, utility light, high bay lighting, ceiling fixtures, and wall fixtures. Figure 1 below illustrates a ceiling fixture with an integral diffuser/lens. Figure 2 below illustrates a troffer with an integral diffuser/lens.



**Figure 1**



**Figure 2**